

Remarks

The Office Action mailed September 5, 2006 has been carefully reviewed and the following remarks have been made in consequence thereof.

Claims 1-20 are now pending in this application. Claims 1-20 are rejected. Claims 1, 12, and 17 have been amended. No new matter has been added.

The rejection of Claims 1-16 under 35 U.S.C §101 is respectfully traversed. Applicants have amended Claims 1 and 12. Claims 2-11 depend, directly or indirectly, from independent Claim 1. Moreover, Claims 13-16 depend, directly or indirectly, from independent Claim 12.

For at least the reasons set forth above, Applicants respectfully request that the Section 101 rejection of Claims 1-16 be withdrawn.

The rejection of Claims 1, 2, 12, and 13 under 35 U.S.C. § 102(b) as being anticipated by Devito et al. (U.S. Patent No. 5,421,331) is respectfully traversed.

Devito et al. describe an automatic identification method. In the method, two endpoints of a plurality of line segments of local maxima (42) are connected together by a straight line segment (50) (column 5, lines 11-14). Moreover, a centerpoint (52) of the straight line segment is determined (column 5, lines 11-14).

Claim 1 recites a method for generating views of a heart along anatomically useful planes, the method comprising "receiving a cardiac 3D dataset representing a portion of the heart; calculating, from the cardiac 3D dataset, at least one of a short axis and a long axis without user intervention; generating, by a processor, a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, wherein said generating the volume comprises creating the volume by region growing; and diagnosing the heart by analyzing the volume."

Devito et al. do not describe or suggest a method for generating views of a heart along anatomically useful planes as recited in Claim 1. Specifically, Devito et al. do not describe or suggest generating, by a processor, a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where generating the

volume includes creating the volume by region growing, and diagnosing the heart by analyzing the volume. Rather, Devito et al. describe connecting two endpoints of a plurality of line segments of local maxima by a straight line segment and determining a centerpoint of the straight line segment. Accordingly, Devito et al. do not describe or suggest generating a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where generating the volume includes creating the volume by region growing. For the reasons set forth above, Claim 1 is submitted to be patentable over Devito et al.

Claim 2 depends from independent Claim 1. When the recitations of Claim 2 are considered in combination with the recitations of Claim 1, Applicants submit that Claim 2 likewise is patentable over Devito et al.

Claim 12 recites a computer readable medium encoded with a program executable by a computer for generating views of a heart along anatomically useful planes, the program configured to instruct the computer to “receive a cardiac 3D dataset representing a portion of the heart; calculate, from the cardiac 3D dataset, at least one of a short axis and a long axis without user intervention; and generate a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, wherein to generate the volume, said program configured to instruct the computer to create the volume by region growing; and diagnose the heart by analyzing the volume.”

Devito et al. do not describe or suggest a computer readable medium encoded with a program executable by a computer for generating views of a heart along anatomically useful planes as recited in Claim 12. Specifically, Devito et al. do not describe or suggest the program configured to instruct the computer to generate a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where to generate the volume, the program configured to instruct the computer to create the volume by region growing, and diagnose the heart by analyzing the volume. Rather, Devito et al. describe connecting two endpoints of a plurality of line segments of local maxima by a straight line segment and determining a centerpoint of the straight line segment. Accordingly, Devito et al. do not describe or suggest the program configured to instruct the computer to generate a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where to generate the volume,

the program configured to instruct the computer to create the volume by region growing. For the reasons set forth above, Claim 12 is submitted to be patentable over Devito et al.

Claim 13 depends from independent Claim 12. When the recitations of Claim 13 are considered in combination with the recitations of Claim 12, Applicants submit that Claim 13 likewise is patentable over Devito et al.

For at least the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1, 2, 12, and 13 be withdrawn.

The rejection of Claim 3 under 35 U.S.C. § 103(a) as being unpatentable over Devito et al. in view of Geiser et al. (U.S. Patent Application Publication No. 20030153823 A1) is respectfully traversed.

Devito et al. is described above.

Geiser et al. describe a method for quantitatively analyzing digital images. In the method, a "long axis" refers to an image of a heart which visualizes structures in a plane parallel to a longitudinal axis (paragraph 27). The long axis extends from an apex or tip of the heart to a base, which can include an aorta and posterior portions of the left and right atrium (paragraph 27).

Claim 3 depends indirectly from independent Claim 1 which is recited above. Neither Devito et al. nor Geiser et al., considered alone or in combination, describe or suggest a method for generating views of a heart along anatomically useful planes as recited in Claim 1. Specifically, neither Devito et al. nor Geiser et al., considered alone or in combination, describe or suggest generating, by a processor, a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where generating the volume includes creating the volume by region growing, and diagnosing the heart by analyzing the volume. Rather, Devito et al. describe connecting two endpoints of a plurality of line segments of local maxima by a straight line segment and determining a centerpoint of the straight line segment. Geiser et al. describe visualizing a plurality of structures in a plane parallel to a longitudinal axis. Geiser et al. further describe a long axis that extends from an apex or tip of a heart to a base, which can include an aorta and posterior portions of the left and right atrium.

Accordingly, neither Devito et al. nor Geiser et al., considered alone or in combination, describe or suggest generating a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where generating the volume includes creating the volume by region growing. For the reasons set forth above, Claim 1 is submitted to be patentable over Devito et al. in view of Geiser et al.

When the recitations of Claim 3 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claim 3 likewise is patentable over Devito et al. in view of Geiser et al.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claim 3 be withdrawn.

The rejection of Claims 4-8 and 14-16 under 35 U.S.C. § 103(a) as being unpatentable over Devito et al. in view of He et al. (U.S. Patent 6,217,520) is respectfully traversed.

Devito et al. is described above. He et al. describe a diagnostic medical ultrasound method. In the method, each end of systole (ES) in a plurality of apical 4-chamber (A4C) images can be combined with the corresponding ES in a plurality of apical 2-chamber (A2C) images to calculate left ventricle volume at ES (column 7, lines 2-67).

Claims 4-8 depend indirectly from independent Claim 1 which is recited above. Neither Devito et al. nor He et al., considered alone or in combination, describe or suggest a method for generating views of a heart along anatomically useful planes as recited in Claim 1. Specifically, neither Devito et al. nor He et al., considered alone or in combination, describe or suggest generating, by a processor, a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where generating the volume includes creating the volume by region growing, and diagnosing the heart by analyzing the volume. Rather, Devito et al. describe connecting two endpoints of a plurality of line segments of local maxima by a straight line segment and determining a centerpoint of the straight line segment. He et al. describe calculating left ventricle volume at an end of systole (ES) by combining ES in a plurality of apical 4-chamber (A4C) images with the corresponding ES in a

plurality of apical 2-chamber (A2C) images. Accordingly, neither Devito et al. nor He et al., considered alone or in combination, describe or suggest generating a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where generating the volume includes creating the volume by region growing. For the reasons set forth above, Claim 1 is submitted to be patentable over Devito et al. in view of He et al.

When the recitations of Claims 4-8 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 4-8 likewise are patentable over Devito et al. in view of He et al.

Claims 14-16 depend indirectly from independent Claim 12 which is recited above. Neither Devito et al. nor He et al., considered alone or in combination, describe or suggest a computer readable medium encoded with a program executable by a computer for generating views of a heart along anatomically useful planes as recited in Claim 12. Specifically, neither Devito et al. nor He et al., considered alone or in combination, describe or suggest the program configured to instruct the computer to generate a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where to generate the volume, the program configured to instruct the computer to create the volume by region growing, and diagnose the heart by analyzing the volume. Rather, Devito et al. describe connecting two endpoints of a plurality of line segments of a local maxima by a straight line segment and determining a centerpoint of the straight line segment. He et al. describe calculating left ventricle volume at an end of systole (ES) by combining ES in a plurality of apical 4-chamber (A4C) images with the corresponding ES in a plurality of apical 2-chamber (A2C) images. Accordingly, neither Devito et al. nor He et al., considered alone or in combination, describe or suggest the program configured to instruct the computer to generate a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where to generate the volume, the program configured to instruct the computer to create the volume by region growing. For the reasons set forth above, Claim 12 is submitted to be patentable over Devito et al. in view of He et al.

When the recitations of Claims 14-16 are considered in combination with the recitations of Claim 12, Applicants submit that dependent Claims 14-16 likewise are patentable over Devito et al. in view of He et al.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 4-8 and 14-16 be withdrawn.

The rejection of Claims 9-11 under 35 U.S.C. § 103(a) as being unpatentable over Devito et al. in view of Xu et al. (U.S. Patent 5,699,799) is respectfully traversed.

Devito et al. is described above. Xu et al. describe an automatic determination method. In the method, a determination is made of a curved axis of a tube-like shaped object inside an image volume which consists of a set of initial transverse image slices sliced in a direction perpendicular to the long axis of the volume (column 2, lines 26-31).

Claims 9-11 depend indirectly from independent Claim 1 which is recited above. Neither Devito et al. nor Xu et al., considered alone or in combination, describe or suggest a method for generating views of a heart along anatomically useful planes as recited in Claim 1. Specifically, neither Devito et al. nor Xu et al., considered alone or in combination, describe or suggest generating, by a processor, a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where generating the volume includes creating the volume by region growing, and diagnosing the heart by analyzing the volume. Rather, Devito et al. describe connecting two endpoints of a plurality of line segments of a local maxima by a straight line segment and determining a centerpoint of the straight line segment. Xu et al. describe determining a curved axis of a tube-like shaped object inside an image volume which consists of a set of initial transverse image slices sliced in a direction perpendicular to the long axis of the volume. Accordingly, neither Devito et al. nor Xu et al., considered alone or in combination, describe or suggest generating a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where generating the volume includes creating the volume by region growing. For the reasons set forth above, Claim 1 is submitted to be patentable over Devito et al. in view of Xu et al.

When the recitations of Claims 9-11 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 9-11 likewise are patentable over Devito et al. in view of Xu et al.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 9-11 be withdrawn.

The rejection of Claims 17 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Devito et al. in view of Knoplioch et al. (U.S. Patent Application Publication 20020156359) is respectfully traversed.

Devito et al. is described above.

Knoplioch et al. describe a cardiac display protocol. The protocol includes receiving data regarding a position of at least one landmark on a prescription image to define a series of slices through a heart along at least one anatomical plane (paragraph 10).

Claim 17 recites a medical imaging apparatus for generating views of a heart along anatomically useful planes, the medical imaging system apparatus comprising “an imaging system comprising: a detector array; at least one radiation source; and a computer coupled to said detector array; and a workstation coupled to said computer, said workstation configured to: receive a cardiac 3D dataset representing a portion of the heart; calculate at least one of a short axis and a long axis without user intervention; and generate a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, wherein to generate the volume, said workstation configured to create the volume by region growing.”

Neither Devito et al. nor Knoplioch et al., considered alone or in combination, describe or suggest a medical imaging apparatus for generating views of a heart along anatomically useful planes as recited in Claim 17. Specifically, neither Devito et al. nor Knoplioch et al., considered alone or in combination, describe or suggest the workstation configured to generate a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where to generate the volume, the workstation configured to create the volume by region growing. Rather, Devito et al. describe connecting two endpoints of a plurality of line segments of a local maxima by a straight line segment and determining a centerpoint of the straight line segment. Knoplioch et al. describe receiving data regarding a position of at least one landmark on a prescription image to define a series of slices through a heart along at least one

anatomical plane. Accordingly, neither Devito et al. nor Knoplioch et al., considered alone or in combination, describe or suggest the workstation configured to generate a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where to generate the volume, the workstation configured to create the volume by region growing. For the reasons set forth above, Claim 17 is submitted to be patentable over Devito et al. in view of Knoplioch et al.

Claim 18 depends from independent Claim 17. When the recitations of Claim 18 are considered in combination with the recitations of Claim 17, Applicants submit that dependent Claim 18 likewise is patentable over Devito et al. in view of Knoplioch et al.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 17 and 18 be withdrawn.

The rejection of Claims 19 and 20 under 35 U.S.C. § 103(a) as being unpatentable over Devito et al. in view of Knoplioch et al. and further in view of He et al. is respectfully traversed.

Devito et al., Knoplioch et al., and He et al. are described above.

Claims 19 and 20 depend indirectly from independent Claim 17 which is recited above.

None of Devito et al., Knoplioch et al., or He et al., considered alone or in combination, describe or suggest a medical imaging apparatus for generating views of a heart along anatomically useful planes as recited in Claim 17. Specifically, none of Devito et al., Knoplioch et al., or He et al., considered alone or in combination, describe or suggest the workstation configured to generate a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where to generate the volume, the workstation configured to create the volume by region growing. Rather, Devito et al. describe connecting two endpoints of a plurality of line segments of local maxima by a straight line segment and determining a centerpoint of the straight line segment. Knoplioch et al. describe receiving data regarding a position of at least one landmark on a prescription image to define a series of slices through a heart along at least one anatomical plane. He et al. describe calculating left ventricle volume at an

end of systole (ES) by combining ES in a plurality of apical 4-chamber (A4C) images with the corresponding ES in a plurality of apical 2-chamber (A2C) images.

Accordingly, none of Devito et al., Knoploch et al., or He et al., considered alone or in combination, considered alone or in combination, describe or suggest the workstation configured to generate a volume of a ventricle of the heart upon receiving a selection of a phase of the heart, where to generate the volume, the workstation configured to create the volume by region growing. For the reasons set forth above, Claim 17 is submitted to be patentable over Devito et al. in view of Knoploch et al. and further in view of He et al.

When the recitations of Claims 19 and 20 are considered in combination with the recitations of Claim 17, Applicants submit that dependent Claims 19 and 20 likewise are patentable over Devito et al. in view of Knoploch et al. and further in view of He et al.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 19 and 20 be withdrawn.

Moreover, Applicants respectfully submit that the Section 103 rejections of Claims 3-11 and 14-20 are not proper rejections. As is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. None of Devito et al., He et al., Xu et al., Knoploch et al., or Geiser et al., considered alone or in combination, describe or suggest the claimed combination. Furthermore, in contrast to the assertion within the Office Action, Applicants respectfully submit that it would not be obvious to one skilled in the art to combine Devito et al. with He et al., Xu et al., Knoploch et al., or Geiser et al. because there is no motivation to combine the references suggested in the cited art itself.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicants' disclosure. In re Vaeck, 20

U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejections are based on a combination of teachings selected from multiple patents in an attempt to arrive at the claimed invention. Specifically, Devito et al. teach connecting two endpoints of a plurality of line segments of local maxima by a straight line segment and determining a centerpoint of the straight line segment. Xu et al. teach determining a curved axis of a tube-like shaped object inside an image volume which consists of a set of initial transverse image slices sliced in a direction perpendicular to the long axis of the volume. Knoplioch et al. teach receiving data regarding a position of at least one landmark on a prescription image to define a series of slices through a heart along at least one anatomical plane. Geiser et al. teach visualizing a plurality of structures in a plane parallel to a longitudinal axis. Geiser et al. further teach a long axis that extends from an apex or tip of a heart to a base, which can include an aorta and posterior portions of the left and right atrium. He et al. teach calculating left ventricle volume at an end of systole (ES) by combining ES in a plurality of apical 4-chamber (A4C) images with the corresponding ES in a plurality of apical 2-chamber (A2C) images. Since there is no teaching nor suggestion in the cited art for the combination, the Section 103 rejections appear to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejections of Claims 3-11 and 14-20 be withdrawn.

For at least the reasons set forth above, Applicants respectfully request that the rejections of Claims 3-11 and 14-20 under 35 U.S.C. 103(a) be withdrawn.

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



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